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The Journal
of the
Mysore Agricultural
and
Experimental Union.

Vol. VII. 1925. No. 3

The Eighth Annual Meeting of the Mysore Agricultural and Experimental Union.

Welcome Speech

BY

H. Srinivasa Rao, Esq.,

Retired Deputy Conservator of Forests, Vice-President of the Union.

MR. KRUMBIEGEL, LADIES AND GENTLEMEN,

It is my pleasant duty this day to extend a hearty welcome to you all for this the Eighth Annual Meeting of the Mysore Agricultural and Experimental Union. This is a duty which in previous years used to be so ably performed by our beloved President, Dr. Coleman, who used to welcome you not only in his own homely happy manner but with a learned and illuminating speech. I need hardly say that we all regret very much that he is not with us to-day to conduct the proceedings of this Meeting which he always loved and valued much. I thank you all for the interest you have evinced in coming here at considerable expense and trouble from places far and near to take part in the proceedings of this Meeting which is proof clear of your desire to advance the common object we have all in view, *i.e.*, the progress of Agriculture.

The current year is marked by great variations in rainfall. The *mungar* or early rains set in inspiring great hopes, but the *hain* and *hingar* rains, *i.e.*, the south-west and north-east monsoon showers were very scanty. The nature of rainfall has been very unfavourable for successful agriculture. In the *maidan* districts, the distribution has been very

unequal all over. A few days of scanty rainfall, often followed by prolonged periods of drought, has been the nature of the season. Heavy tank-filling rains fell in a few localities and ensured the paddy crop, but over vast areas the tanks got little or no supply. For these reasons, the sowing of food crops has been much delayed and the growth of crops received a severe check, so much so that almost a total failure of very late-sown ragi is noticed in several taluks. On an average, ragi is only 2 to 4 anna crop all over, anything over that being the boon in a few favoured spots where some chance showers must have been the cause of increase.

Deficient rainfall and consequent scarcity of food and fodder in some tract or other has been the common complaint successively for the past 3 or 4 years, and it is our habit to think about remedial measures only when pinching poverty stares us in the face.

I suggested in the last annual meeting that sinking deep irrigation wells would help the people to tide over famine years, as they would be able to grow short season crops of food and fodder and the difficulties which are frequently coming would be solved to a great extent. In the Economic Conference of 1916, this question of irrigation wells was one of the propositions moved by me ; and it was passed as a resolution with the common consent of all present. Many persons expressed that my suggestion of digging wells on *Takavi* system under Government supervision was very practicable and useful ; but little or no action has been taken in the matter. The famine-resisting power of the people can never be improved unless well-sinking receives its due share of attention and until the restoration of minor tanks is undertaken seriously on a large scale. The minor tanks are far more numerous than the major ones. They are distributed over the whole country, almost every village in the maidan owning a tank ; but most of these tanks are in disrepair or are silted up, and the ryots are unable to secure any crop under them, unless they fill several times in a year. It is, therefore, very necessary to have them restored if the grain production of the country has to be increased. I humbly request all those assembled here, as well as those concerned, to urge the Government to kindly pay greater attention to these important questions of irrigation. If irrigation is improved, it will solve the question of food and fodder to a great extent ; and the pinch of famine would not be so much felt.

Owing to successive bad years, the economic condition of the people has grown from bad to worse, and many have hardly any resources with which to face the famine. The condition of the rural population can be judged from the following statistics which I have gathered in a typical

village called Hungainhally in the Malur Taluk wherein I reside. This village has 72 families with a population of 466. I divide them into 4 classes according to their resources.

(i) The 1st class comprises 29 families having 221 people. They have the means to enjoy two or more meals a day for a period of a year or so. Out of these 29 well-to-do families, 18 possess the advantage of some irrigation well or other under which they raise potatoes, chillies and sugarcane, etc., which pay well. Only 2 out of 29 are in debt to a small extent.

(ii) The 2nd class consists of 16 families with 103 people. They are of limited means and struggle hard to make both ends meet. For want of sufficient income from land, they resort to occupations other than agriculture to supplement their income. They live in a poor manner. 3 families out of 16 are in debt and only 5 have the use of irrigation wells.

(iii) The 3rd class consists of 3 families with 25 people. Their income is still more limited though they resort to other occupations. These have often to forego a second meal and all of them are indebted to a small extent.

(iv) The 4th class comprising 24 families with 224 souls is the most miserable class. Their resources are very poor and they cannot hope to get two full meals any day, except for a few months following a good harvest. Being hard up for food, they are often forced to go uninvited to enjoy the hospitality in marriage houses, *Jathras* and festivities, etc., where free feeding can be secured. They have very often to starve sometimes or live on scanty and poor meals or even *conjee*, and some of these commit petty thefts at times.

Having found these divisions, I have been searching for the cause of these differences among them. After long experience I am now able to trace the cause to differing degrees of working tendency or application to work which they possess. On an examination of their industrial nature, I find it necessary to divide them also into 4 groups :—

(i) The 1st group consists of hard-working people who never waste any time. They have the experience of their work and exercise forethought. They work on an average for about 10 hours a day.

(ii) The 2nd class are good workers. They occasionally while away part of their time and yet put in about 7 or 8 hours a day. They rise late and commence work late also.

(iii) The 3rd or easy-going class work on an average for about 5 or 6 hours ; commence work late and close early. These waste much time in idle talk and useless engagements. They are wanting in perseverance.

(iv) The 4th or indolent class consists of idlers who do not work on all days. They are the unfailing elements in all public gatherings, such as *Jathras*, Car Festivals, Village Dramas and Weekly Bazaars, etc. Sometimes they work hard for a day or two and then do not think of work for days together. Their work is perfunctory and untimely. They are eager to sow seed, but neglect cultivation. On an average, they turn out only 3 to 4 hours' work in a day.

I attribute the differences in prosperity to differences in working capacity. The four classes of prosperity go for the most part hand in hand with the four classes of industry, thereby showing that, apart from other causes, those who are industrious and hard-working are generally the most prosperous and *vice versa*. I have gathered these facts from experience of village life and what holds good in the case of one village, I think, is true enough of all villages. Among the social and religious classes the majority of Brahmins, Mussalmans, Bedars, Woddars and Panchamas, etc., are the poorest. Among Brahmins and Mussalmans man derives no help from females in doing agricultural field work. Females of the former class are fully engaged in home work of a religious nature, whereas the females of the latter class are Purda women not allowed to appear before the public. In both these classes, therefore, one man has to earn and support many souls. Hence the cause of poverty among these classes. With regard to Bedars, Woddars and Panchamas, etc., indolence and often drinking are the cause of poverty.

Such is the economic and industrial condition of the rural population, and our aim ought to be to uplift the lower classes who form a large proportion of our people. We have to struggle against deficient rainfall and vagaries of seasons on one side, and against the inefficient and insufficient output of labour on the other, although our labour resources are full. All our poverty and misery are the result of these two causes combined.

As a remedial measure, I beg to lay stress again on the necessity of improving the irrigation sources as suggested above in order to counteract the effects of the bad seasons ; and to increase the output of labour as a means of increasing the outturn of field produce. We have enough of labour resources, but a change is necessary in the labourers' methods of application to work. It must be one of the objects of the members

of this Association to educate the labourers pointing out the loss they incur by their indolence. We should also influence the members of the Local Boards, especially the Village Panchayat bodies, who can do much to improve the labour conditions in their respective villages. I hope our co-workers will strive to achieve this.

Ladies and gentlemen, I once again welcome you to the Eighth Annual Meeting of our Union.

Annual Report for 1925.

Mr. Chairman, Ladies and Gentlemen,

It gives me much pleasure to welcome you to the Eighth Annual Meeting of the Mysore Agricultural and Experimental Union and to submit the Report for the year ending with 31st October, 1925.

The Union is mainly a body of agriculturists and its chief work consists in conducting field tests of improvements recommended by the Agricultural Department.

The programme of field tests to be conducted in 1924 by our members in co-operation with the Agricultural Department was as follows :—

1. Trial of Improved Implements.
2. Trial of Improved Strains of (*a*) Ragi, (*b*) Groundnuts, (*c*) Castor, (*d*) Paddy, (*e*) Sugarcane and (*f*) Cotton.
3. Trial of Manures for Sugarcane and Paddy.
4. Experiments on the Control of Insect Pests and Fungus Diseases.
5. Sun-flower Ensilage.
6. Sericultural Experiments.

Trial of Implements.

The chief implement tried during the previous years is what is now called the Mysore Plough. As the result of trials made by our members certain improvements were made in the plough and it was finally manufactured by Messrs. Ransomes Jefferies of England. As many as 300 of these ploughs have been sold out already. Trials of this plough in comparison with any other type of improved plough was included in our programme this year with the idea of ascertaining if any further improvement either in design or construction would be found necessary before placing order for a further supply of these ploughs. While a large number of the new ploughs has been purchased by our members, no accurate experiments, such as those conducted in the previous years, have been conducted. The plough is steadily gaining in popularity as the sales disclose.

The trial of implements is by no means confined to the improved plough. Other implements, such as the Cultivator, were tested in previous

years. Members are giving a good deal of their time and thought to the problem of labour-saving implements. One of our members, Mr. T. S. Raghavachar of Kadgodi, has devised an implement which cultivates and earths up the potato crop in one operation. Besides being fairly efficient, it has the additional merit of cheapness in its favour. The implement is on view outside the Hall and when the subject of improved implements is taken up for discussion Mr. Raghavachar will give any information which members may wish to have about the implement.

Trial of Improved Varieties of Seed.

Sugarcane Varieties.—Due to bad seasonal conditions it was not possible to supply seed setts from the Farm for experiment both during the last and the present years.

Ragi Varieties.—Fifteen members conducted ragi varietal tests in 1924. Some of the experiments failed due to the failure of rains ; the results of a few successful tests which have been reported on are given here. H43, H73, H42, K2, H71, H94, H69 and H40 seem to be promising. H73, H40 and H43 seem to have done better than the average in many places. H43 has proved to be earlier than both the local and H22 in some places. As the result of small trials in previous years Mr. Krishnamoorty Rao of Vartur has grown H43 on about 7½ acres this year and reports that the crop has just been harvested while H22 and local ragi crops due to their lateness and failure of rains just now have almost completely dried up. The need of an earlier variety of ragi than the local is being felt in many places. There is no other way of finding out if a variety is early or late than that of trying it on a small scale as a regular experiment in various localities.

These results in most cases will have to be confirmed by trial during at least another season for being reliable. Twenty members have conducted the experiments this year and the results will be known after harvest.

Groundnut Varieties.—Out of 12 members who conducted these trials during 1924, only three members have sent in any report at all. Two of these, report failure due to unfavourable seasonal conditions. The successful experiment was the one conducted by Mr. Anur Munisamy Gowda. He tried two varieties, Mauritius and Carolina. The Mauritius variety yielded at the rate of 3,800 seers dry pods per acre and the Carolina 2,600 seers per acre. Here again the results are to be confirmed by another year's trial. Eighteen members have conducted the trials this year. The results will be available for discussion in the next meeting.

Castor and Paddy Varieties.—Here again out of 8 members who received seed from the Department, not one has sent in a report of results.

One of them has recently written to say that due to causes over which he had no control sufficient attention could not be given to the paddy experiment and that he hopes to take up the work again. This is really hopeful. Thirteen members have conducted the castor varietal tests and 12 members the paddy varietals this year. The results are not yet available.

Manurial Experiments.

Sugarcane Manuring.—While members have been very anxious to undertake these experiments, it has not been possible for the Department to arrange them with members due to shortage of funds. Until the finances of the Department permit, there is probably no prospect of doing any work in this connection.

Paddy Manuring.—Two members undertook these tests last year. One of the experiments was laid out by the Chemical Section of the Agricultural Department on Mr. Anur Munisamy Gowda's land near Sidlaghatta. The manure tried was ammonium phosphate against cattle manure. The following statement gives the details of the experiment and the results :—

Treatment	Area on which tried	Yield in Seers	Yield per Acre
Ammonium Phosphate	10 Guntas	440	1760
Cattle Manure	10 ,,	360	1440

The other trial was made by Mr. Kuppuswamy Mudaliar of Vanivilaspur. It was not a regular experiment. But a few points observed by the experimenter are interesting. While the check plots were attacked by a disease, the plots to which ammonium phosphate was applied were not—the result probably of insufficient nourishment received by the crop on the check plot. The crop on the ammonium phosphate plot ripened twenty days earlier than that on the plots which had received cattle manure. Comparative results are not available.

Spraying for Coffee Koleroga.

Results of spraying experiments against Coffee Koleroga conducted by Mr. T. Narasinga Rao and others, have already appeared in our Journal. More members have conducted the experiment this year.

Fortunately for the Coffee planters the present season seems to have been unfavourable for the spread of the disease. Spraying, obviously, is unnecessary when there is no disease. While the usefulness of spraying is generally admitted, the difficulties of labour and water-supply are found to be the main obstacles in the way of spraying on a large scale. If the dusting experiments of the Department to which reference was made by the President at the last meeting are successful, one obstacle,

viz., that of water-supply, will have been eliminated. The question of insufficient labour-supply will always remain and if spraying or dusting is profitable at all, the labour necessary must be found. The question will be discussed later on at this meeting and it is perhaps unnecessary to dilate on it here.

A Few Criticisms.

So far a brief account of what has been done is given. It is perhaps as important to state briefly what has not been done. The programme of experiments sent round to members at the beginning of the year requires that the seed varietal trials should be conducted continuously for at least three seasons. While much painstaking care is being taken to lay out the plots for experiment, out of about 350 seed varietal trials that have been conducted by the members, very few have been repeated the second year. Indent is received for newer and newer varieties while nothing definite is known about the older varieties tried. Further, it looks as if the enthusiasm exhibited at the time of laying out plots for the experiments seems to diminish in many cases gradually and that similar care is not taken at harvest with the result that varieties get mixed up and the experiments to which so much care and attention was given fail to serve any purpose. It is reported, for instance, that the crop failed so miserably due to a severe drought that it was considered not worth the while to harvest the varieties separately. The total yield from all the varieties from an area of 8 guntas is given as 40 seers of ragi, *i.e.*, about 2 pallas to the acre. For a very bad season such as it is characterized, the yield is not to be considered as almost nothing. And then, some one variety might have done better than others. There are other instances but it is unnecessary to say more than this that some of our members do not seem to have realized sufficiently the importance of these trials. It is hoped that better care will be taken at the impending harvest. Then about reporting results members are supplied forms on which the yields have to be entered and questions are to be answered. But very few reports are actually returned even where the experiment has been carefully conducted. It does not seem to be realized that the general body of the Union has also an interest in the results of the trials and that the Department and the general body are alike likely to be of help in correctly estimating results. And again a mistake is made in supposing that an experiment which has proved a failure as regards money returns is not worth reporting on. On the other hand, an experiment which has been carefully conducted and the results correctly accounted is to be considered a successful experiment irrespective of the money value resulting from it.

Manurial Experiments.

The remarks just made apply to the tests of varieties of crops and do not refer to the manurial trial with crops. These trials conducted up to 1924 were laid out on members' plots by the Department and the results collected also by the same agency. The chief crop concerned was sugarcane, and the very valuable results obtained have already been published in the Journal. During 1924 and 1925 no manurial trials have been conducted, the reason being inadequate funds in the Agricultural Department. Members were informed that the value of manure on each manurial experiment on sugarcane would not exceed Rs. 25 and that on each experiment on paddy would not exceed Rs. 5 over and above what the members would ordinarily spend. Members are evidently not willing to conduct the experiments at that cost. The risk involved in conducting a manurial test and the care necessary in the conduct of it is no doubt greater than that in a seed varietal test. It is for this body to decide the conditions under which members would be willing to undertake the trials. Else we shall have to wait for the favourable circumstances already referred to in the earlier part of this report.

Suggestions for Ensuring Reliability of Tests.

In connection with the scientific experiments, I would venture a suggestion. If accurate results are to be obtained at all, the Department must arrange for special supervision of the experimental plots. While a crop is growing there are many observations which must be made and which miss the untrained eye. It should be possible to arrange for at least one inspection of each experiment while the crop is growing. Observations made at the inspection should be separately recorded for consultation at the time the results are to be interpreted. In the case of crops an inspection will have to be made a little before harvest in order to rogue out mixtures. During these inspections it should be the duty of the inspecting officer to educate the members in the methods of experimentation and interpretation of results. Members should be persuaded to set apart a quantity of pure seed of promising strains not only for being used as seed by themselves but for being distributed for trial among other agriculturists also. This is perhaps the easiest way of extending the experiments on a large scale and of making them really useful. This of course involves a little more expenditure on supervision. But if the Department believes in these experiments the expenditure should be met.

Number of Experimenters.

The number of experimenters has only slightly increased. Out of 220 non-official members, only 38 undertook to conduct any experiment

at all. It is for this meeting to find out the reasons why only so few among our members are interesting themselves in experimental work.

Range Sub-Committees.

A suggestion was made in the last Annual Report that in order that the work of the Union may be better popularized in the Districts and more members and subscribers enlisted, a Sub-Committee for each range of the Agricultural Department with the local Agricultural Inspector as Secretary be formed. The suggestion was accepted by the General Body. Accordingly the Sub-Committees have been formed, but they have not started work. There seems to be a mistaken notion among some of our members that the Union is a Government Organization simply because officials of the Agricultural Department are among its members. It is better to make clear on this point. The Union is not a Government Organization. It is an organization mainly of the agriculturists of the State. This fact should be properly understood by our members before the Sub-Committees start work.

Colonization Scheme.

There is just one subject of general importance about which a word must be said and that is the Colonization Scheme. The scheme which was referred by the Government to the Agricultural Board has now been returned after various stages of consideration with benedictions from that body, back to the Government. It is perhaps advisable for this body to invite the attention of Government to the need and urgency of doing something to help the poor agricultural graduate and to urge the Government to expedite their orders on the scheme.

The Journal of the Union.

There has been as usual delay in the publication of the English edition of the Journal. This is due entirely to inadequate original contributions to its pages. The articles which have appeared have all been contributed by the Agricultural Department. Attempts to interest our non-official members in the matter have resulted in failure. It is impossible to say why they should be so conservative in the matter of making their experiences available to the agriculturists in general. Is it entirely or mainly their unjustifiable modesty that accounts for this ?

The Kannada Edition.—The subject of the Kannada edition of the Journal was discussed thread-bare at the last Meeting. It was, as you are aware, decided that the publication of the Kannada issues in arrears be dropped and from 1925 the Journal should issue as a monthly, provided that funds for which proposals were made could be secured. The resolutions of the General Body were sent up by the Director of Agriculture to Government with a strong recommendation that

an additional sum of Rs. 1,500 be sanctioned by Government towards the publication of the Kannada Journal. Government sanctioned the original subvention of Rs. 1,000 provided for in the Budget of the Department but regretted that the additional sum of Rs. 1,500 recommended by the Director of Agriculture on account of the Kannada Edition could not be sanctioned *for the present*. Now that the finances of the State show signs of improvement it would perhaps be possible for Government to give the Union the help needed and this Meeting would do well to consider the subject again.

Can the Union be Self-Supporting ?

There is one point in connection with our finances which it would perhaps be appropriate to discuss briefly at this stage, and that is the suggestion that every effort should be made to make the Union self-supporting. It seems as if the suggestion is made without giving sufficient thought to the peculiar nature of our organization. There is no such body in the whole of India with which our Union could be appropriately compared. This is an organization of agriculturists whose main object is to test the improvements recommended by the Agricultural Department as the result of continued investigation by that body in its laboratories and farms. If the Agricultural Department has no laboratories and farms and consequently no recommendations to make the members of the Union have no improvements to try on their land unless indeed they undertake to start their own laboratories and experimental farms. Further, no agricultural knowledge obtained in foreign countries is of any use in agriculture unless it is tested by a highly qualified staff of agricultural investigators for local suitability. So, there is no question of investigation by members independent of the Department except perhaps on an exceedingly limited scale. If it is conceded that agricultural problems should mainly be investigated by an agricultual department qualified for it and that the co-operation of agriculturists should be enlisted in order first to test the suitability of its recommendations in the varied conditions of soil and climate in the State and then to recommend for general adoption by agriculturists as a whole, if this is conceded, then it is easy to see that this experimental work which members are conducting now is really an important part of the work of the Department itself. If that is so, who should finance this work but the Department itself ? And then is it not also the duty of the Agricultural Department to disseminate agricultural knowledge obtained as the result of its work among the agriculturists ? Should a body of agriculturists finance this part of its work, for is it not the fact that the Journal, the publication of which has been giving us so much anxiety, really the organ of the Department

of Agriculture in its work of spreading sound agricultural knowledge in the country ? It is difficult to see why a mainly non-official organization such as ours should be expected to do this duty and be asked to make itself self-supporting, for if the Union confines itself to its main work, it needs very little funds and can easily support itself. On the other hand, when a non-official organization undertakes in an enterprising manner to do work which is primarily the function of a Government Department is it not fair that the State should give it all the help it needs ? It was suggested in the last report that if finances could not be suitably arranged for, the publication of the Journal should be stopped. The suggestion is made again for serious consideration at this Meeting.

STATEMENT OF RECEIPTS AND EXPENDITURE.

The following is a statement of receipts and expenditure for the year ending with 31st October 1925 :—

Statement of Receipts and Expenditure from 1st November, 1924 to 31st October, 1925.

RECEIPTS	Rs.	A.	P.	EXPENDITURE	Rs.	A.	P.
Opening Balance ...	56	1	5	Printing Charges ...	756	8	0
Entrance Fee	72	0	0	Establishment	848	3	0
Annual Fee	532	14	0	Annual Meeting, 1924 ...	186	9	1
Journal Subscription ...	222	0	0	Postage	47	13	0
Meeting Subscription ...	85	0	0	Miscellaneous	12	6	0
Advertisements ...	48	0	0		1,841	7	1
Subvention for 2 years ...	1,500	0	0				
Miscellaneous	6	0	0	Cash on hand	671	2	4
TOTAL ...	2,522	9	5	TOTAL ...	2,522	9	5

Estimate upto the end of the Calendar Year.

ASSETS	Rs.	A.	P.	LIABILITIES	Rs.	A.	P.
Arrears recoverable from members	130	0	0	Bills pending	150	0	0
Cash on hand	670	0	0	Printing 3 issues of English Journals with cost of blocks, etc. ..	550	0	0
Subscription for meeting	200	0	0	Establishment ..	220	0	0
	1,000	0	0	Postage, etc.	30	0	0
Deficit..	200	0	0	Annual Meeting ..	250	0	0
TOTAL ..	1,200	0	0	TOTAL ..	1,200	0	0

In the last report a deficit of Rs. 850 was anticipated to occur on the 31st December 1924, and the hope was expressed that it could be met only

if the Government sanctioned the subvention applied for. Government very kindly sanctioned the subvention with the result that the deficit is reduced to 200 Rupees on the 31st December this year. This is the first year for some years for so small a deficit and if we do not consider the situation seriously but continue with the sort of hope on which we have lived previously we shall be restarting a series of years of heavy deficit. So far as expenditure connected with the experimental work is concerned, it is the business of the Agricultural Department to find funds if they have faith in the work. The General Body might, and I believe should, express its opinion on the necessity there is for such experimental work. But as regards the publication of the Journal, this meeting should, I think, decide once for all on the course of action to be adopted in future. For myself, I believe, the Union should be able to exist without a Journal. The decision, however, is in your hands.

I shall have failed in my duty, if, before I close, I did not record the very generous help the Union has received from its President Dr. Coleman during the eight years of its existence. The non-official members of the Union, as you are aware, organized a special meeting to present an address to our President on the 3rd July. Members came to Bangalore from far-off places in Shimoga and Chitaldroog Districts to attend the meeting and to express their deep debt of gratitude to one who had toiled in their midst for nearly eighteen years in the cause of the agriculture of our State. Dr. Coleman was, to say the bare fact, the very soul of the Union. He gave to it freely of his valuable time, his masterly intellect and his purse. To him money was a secondary and the progress of agriculture the first consideration.

On behalf of the Union also I offer our cordial greetings and congratulations to our Officiating Director Mr. G. H. Krumbiegel who has been one of our members for years. We pray that it may be possible for him to support our cause to the best of his ability during the period of his stewardship of the Agricultural Department.

N. VENKATSUBBAYA,
Secretary.

13—11—1925.

Address by G. H. Krumbiegel, Esq., F.R.H.S.,
Officiating Director of Agriculture in Mysore.

Mr. Srinivasa Rao, Members of the Agricultural and Experimental Union and Gentlemen,

It is a great pleasure to me to have this opportunity of making a closer acquaintance with you all and I greatly appreciate the honour you have done me in asking me to preside at your Annual Meeting.

Since His Highness' Government honoured me with the charge of the Agricultural Department, I have had, during my tours, many opportunities of seeing and appreciating your work and we have just listened to the Secretary's able report of the good work done during the year. While I most sincerely congratulate you on the way in which you are carrying out the objects of the Union, I think we all ought never to forget to be grateful to Dr. Coleman for having inaugurated and sustained this excellent organization.

The Union is based on sound principles and if worked on those principles its potentialities for assisting and extending the work of the Agricultural Department and thereby doing good to the agriculturists of the whole State, are immense. It is for that reason I hope you will never lose sight of these principles and of the vast potentialities. The main principles as I understand them are :—

(1) to extend the work done by the Department in testing and proving the new varieties of crops evolved and tried in the Government Farms ;

(2) that these tests must be on a fairly large field scale to enable correct results to be obtained ;

(3) that the tests must be repeated for several years to get correct averages ;

(4) that Implements and Manures be similarly tested ;

(5) that careful records and reliable figures be submitted to the Department so that sound and useful information as to the suitability or otherwise of the respective crop, manure or implement to the various localities can be compiled by the Department and published in the Journal.

All this involves patience and perseverance and may not seem to many members as interesting as independent experiments and attempts at Plant-breeding, but remember that in the thoroughness of the above tests, in their patient repetition and their correct recording lies the possibility of the wide-spread good to the State in general, a result which cannot be attained by the tests limited to the few Government Farms.

The sound development of Agriculture forms one of the great factors in Nation Building.

Our development work lies in two main directions :—

(1) The greater output per acre and (2) the extension of the cultivated area ; and again under these fall :

Breeding plants of higher yield ;
Improving Cultivation, (manures, etc.) ;
Improvement of Irrigation ;
Live-Stock improvement.

With my short connection with the Department I feel it would be presumption to dilate to you who are so well acquainted with our work, at any rate on Departmental matters but as our mutual work is so intimately connected—and I am very anxious that the real value of the Union in their sound work should be brought out—that I feel I must touch upon some of the salient features.

During my inspections I have been forcibly impressed with the importance of our Field Staff and the need of its better organization and extension in order to give the ryot a wider and greater benefit of our scientific work. This will include closer co-operation between the various officers of the agricultural and the scientific sections. Advice and materials will thereby be more readily at your disposal and I look forward to the co-operation of the Union. From the plant-breeding section we shall continue sending out several of the new varieties of Ragi, Groundnut and Sugarcane and in these I shall welcome any sound testing work by the Union, work which will reliably establish their suitability or otherwise for your particular district and soils. In Ragi a range of early maturing forms is being purified for replacing H22 where the latter is unsuitable.

In connection with a proved variety such as H22 Ragi we have the problem of distribution of seed from ryots' fields. The imperative necessity of keeping such fields strictly pure using all precautions in harvesting and storing is not fully realized, which has led to complaints by respective purchasers. Much can be done by Union members who grow seed for distribution.

In connection with manures, extensive tests are being made to find the optimum dose actually required by the crop as it has been found that in many soils one half of the usual dose is quite as productive as the full dose ordinarily given. Many opportunities for testing these will offer themselves to members of the Union. This reminds me of an aspect in the work of increasing production and that is the cost.

Farm accounts are essential, for all the endeavours of doubling the out-turn per acre will not help *if the cost is prohibitive.*

Trials with implements require a lot of confirmations. Improvements in and the local manufacture of ploughs are still being pushed on and ample opportunity, I hope, will, in the near future, offer itself for further tests. Similarly, the respective merits of the three principal sugar-cane mills require further close investigation. Regarding Tractor ploughing I do not hold that the last word has been said. Its value for certain soils is unquestionable.

In Live-Stock work we have lost in Mr. Davison an experienced officer who will be sadly missed at this meeting. Still the work is being vigorously carried on and lines of procedure laid down.

The Amrut Mahal Department is gradually being organized and undesirable animals weeded out, the young stock trained in the herds and it should ere long be possible to select a considerable number of young breeding bulls.

Breeding work with *Hallikar* cattle will have to be again considered, for improvements are possible though it may be a slower process than with imported breeds. After all, the *Hallikar* is our indigenous stock.

I do not know whether any of our members have taken up sheep breeding, but a good deal more vigorous and earnest work is required.

The important question connected with Live-Stock is the fodder question and I hope that in the earnest of your deliberations this will be fully discussed.

The Veterinary Department has been fully employed and strengthened. In order to eradicate Rinder-pest Government have liberally sanctioned funds for serum to conduct the active or permanent immunization. Here, much co-operation of the ryot is necessary and the unrestricted movement of cattle all over the Province is inimical to complete success. Members can afford much help.

I am sorry you have on your programme no item for discussion of Co-operation. The formation of Agricultural Co-operative Societies is one of the most urgent and desirable measures in agricultural improvements. With the active help of the Registrar of Co-operative Societies a healthy move has been made in this direction. This will relieve the Department of the difficult situation created by credit sales. You will hardly realize the amount of time, both of the Director and Field officials, which is taken up in the processes involved in the collection of old arrears. This is time taken up by a small minority to the detriment of the majority. Similarly if we spend our annual grant, say, for manures or implements and sell those at credit, we benefit at the outset a limited

number of ryots but our operations then cease, whereas if the articles are sold for cash the amount can be turned over and over again and quantities 10 times or more can be sold, as we now actually do, benefiting the greater majority and at the same time avoiding the loss of time incidental to recovery of debts. This aspect is not realized by the people as is evident from the large number of representations for credit sales made in the Representative Assembly. Your co-operation in creating a better understanding will be most valuable. But this is only a minor aspect of the question of Co-operative Societies.

A properly organized Agricultural Co-operative Society must consist of active and working agriculturists. It should be able to advance working expenses, do all the buying, harvesting, and marketing of the produce, on co-operative lines and adjust the balance between expenses and proceeds of each member immediately after marketing is effected, which must, under ordinary normal conditions, lead to a substantial credit to the member.

The areca-nut grower will then get his full value of the crop and will not want the Department to give him the required spraying material on credit and which he may find difficult to pay from what the *Sowcar* chooses to allow him for the crop.

The sugar-cane grower will be able to get his working expenses at a minimum interest and receive the full value for his crop instead of having to take the pittance the *Labbi* contractors choose to offer.

The Society will gradually be able to write off the original cost of the plant and reduce harvesting and milling expenses.

So long as honesty of purpose is the guide there can be no doubt of the success of such societies and I hope you will give your hearty assistance in furthering the movement.

You have Sericultural work on your programme. Of all the subsidiary agricultural occupations, this is the most important and feasible. The Department has considerably expanded and we are now actively pushing co-operative work and the formation of Sericultural Taluk and District Associations with a Central Association. This should help to improve the standard of the Mysore silk, secure good markets and generally bring the benefits of the Departmental work to the Sericulturist even in the remotest village. With full co-operation and the vanishing of the recent depression in the market, we may be hopeful of considerable betterment in the near future.

Gentlemen, I am afraid I have kept you too long already and I have not touched upon the wider or world aspect of Agriculture but our home

problems are so vast and urgent and so deserving of your increased co-operation that I feel you will not mind the time taken.

Likewise the subject of finance, the Journal, etc., which comes under business items, I leave to the discussions.

If I may add a word or two on my own behalf, it is to solicit the continuance of your confidence in the work of the Department while it is in my charge. I feel that if I have your confidence and increasing co-operation our combined efforts will, even if my term be short, result in a fair amount of satisfaction to yourself and Dr. Coleman— your President.

The Orange Borer in Coorg.

BY

K. Kunhi Kannan, M.A., Ph.D., F.E.S.,

Entomologist to the Government of Mysore.

The orange borer in Coorg is the grub of a beetle hitherto known as *Chloridolum alcmene* having been identified as such by both Lefroy and Fletcher. But recent investigations made by me at the request of the Coorg Government show that this identification is incorrect. There was an emergence of the adult beetles in May and June last and about forty beetles were obtained either by cutting open the tree or in flight. These specimens were all of a different species, *viz.*, *Chelidonium cinctum*, having none of the distinguishing characters of *Chloridolum*. It appears probable, therefore, that both Lefroy and Fletcher were mistaken in their identification of the insect—the more so because the illustrations they give of the beetle are not, as far as can be made out, of *Chloridolum*. A specimen sent from Pusa collection as orange borer from Coorg does not answer to the description of the latter genus.

It is possible that the mistake arose from the very great variation in marking and colour which is found in the insect. At one extreme there are forms without any marking at all and at the other there is on the wing-covers a yellow cross-bar bent sharply backwards at either end. This bar is so conspicuous that beetles showing it are likely to be looked upon as different from others which do not possess it. But between these extremes there is a perfect gradation of forms in which the main element of variation is in the cross-bar. The colour variation is no less striking. There are individuals of bright metallic green and others blue or violet with or without metallic lustre. But in structural features all the individuals agree and there can be no doubt they all belong to one and the same species.

which, conveying as it does the latest market reports each day, many farmers consider as an absolutely essential bit of equipment for the farm. Lastly there is the almost universally used and extraordinarily cheap electric power which provides lighting for the house and farm buildings and motive power for much of the farm machinery. All of these changes have drawn together the country and the town folk so that the line of separation which was so marked when I was a youth has now practically disappeared, for all these instruments of comfort and convenience have been introduced among the agriculturists during the past twenty years.

As to the actual farming operations themselves these have undergone, as one might expect, hardly as striking alterations and one at times wonders how the farmer is able to pay for all the comforts he now possesses. Rural indebtedness exists ; my work did not lead me to investigate the question but I doubt if it is now any greater than it was twenty years ago. The introduction of improved varieties of crops and the more general use of commercial fertilizer has undoubtedly led to an increase in outturn per acre. On the other the introduction of certain types of labour-saving machinery has led to the reduction of production costs but this reduction cannot be very striking. Although the horse has been practically banished from the roads, he remains the main source of motive power on the farm itself. Tractors are a comparative rarity except in the fruit belt where they are rather commonly used for cultivation purposes in orchards and vineyards.

The chief changes in farm machinery have been in the way of designing larger and better horse-drawn implements so that one man can direct the motive energy of three or four horses instead of only one or two. In my youth in Ontario the three and four horse team was rather a rarity, its use being practically confined to the hauling of a grainbinder. With increased wages has come the necessity of using more economically the labour force, hence the introduction of more efficient implements. The grainbinder and the mower were of course in use long before I left Canada but the size has considerably increased. The same may be said of the seed drill. Implements such as manure spreaders, hay loaders, potato planters, which were not often seen in Ontario in my days, are now very common.

SELECTIONS.

I

Milk Yields.

It is obvious that a high milk yield involves the consumption of a correspondingly large quantity of food ; but there is ample evidence from actual experiments and ration records that abundant food or infinite care in feeding will not make up for the lack of an efficient udder : the first requisite is a cow possessing not only sufficient digestive capacity but also the necessary dairy temperament and milk manufacturing organs. "You can feed a cow until she bursts, but she will not make milk unless she has the inheritance for doing it." The desired type of cow is the product of parents which possessed active or latent dairy qualities. The milk-recording movement has for its objects the encouragement of dairy farms to breed from parents whose milk-producing ancestry has been demonstrated by actual measurement.—*The Journal of the Ministry of Agriculture,* Vol. XXXII, No. 6.

II

Thinner Seed Rate in Paddy Cultivation.

During the *Maha* season of 1924–1925 the following among other trials were carried out, and the results are now published as they appear to be interesting, in view of the fact that in Ceylon far too much seed is sown on paddy fields.

The trials were carried out in Kondedeniya village, near Katugastota.

An extent of approximately half an acre or a *pela* in extent was divided into two plots of equal size.

One plot was transplanted with six weeks old seedlings of selected *Hathiel* on the 9th of October, planting at the rate of 2 or 3 seedlings 4 to 6 inches apart. Instead of using 5 *lahas* for raising the necessary seedlings for this extent of field as is the practice among local paddy cultivators only 4 *lahas* were used thus effecting a reduction of 20% in the seed.

The other plot was sown broadcast with the same type of paddy on 28th August, and the same reduction of seed was made here too.

The broadcasted field was harvested on February 28th, 1925 and the transplanted plot on March 6th. The yield from the transplanted plot

was 12¼ bushels or 49 bushels per acre. The yield from the broadcasted plot was 9½ bushels or 38 bushels per acre.

Compared with the yields of adjoining fields of transplanted and broadcasted paddy of the same type these results were in no wise different, thus clearly indicating that the existing seed rate in paddy can be reduced with advantage.

In this locality there are about 300 acres of paddy on which according to the prevailing practice 600 bushels of paddy are sown. If the seed rate can be reduced by 20%—it can be reduced by a much larger margin—a saving of 120 bushels of paddy in a season can be effected. With the gradual introduction of Pure Line paddy and the practice of transplanting becoming more general there are the possibilities of reducing the seed rate by 50% when transplanting is carried out and by 20% to 30% when broadcasting. The paddy cultivator has begun to realize that a saving of seed can be effected and there are in this locality many instances this *Maha* season where the 20% reduction has taken place.—*The Tropical Agriculturist*, Vol. LXV, No. 4.

III

Potato Culture.

An important conference was held on November 20, at Rothamsted Experimental Station.

Sir John Russell, Director of the Rothamsted Station, said that in contemplation of the decline of the arable cultivation in this country in the last sixty years, the potato crop offered a ray of comfort. Its acreage had increased from 355,000 to 507,000, and its production from 2,750,000 tons to 4,000,000 tons. He uttered a warning against too rapid increase, however, in consequence of the fall in price resulting from a glut. In considering manuring, three factors had to be borne in mind. In the first place it was essential that there should be sufficient air-space and moisture in the soil to allow the tubers to grow. Secondly, disease was a more important factor for potatoes than any other crop; scab was associated with an alkaline soil, and blight with over-manuring with nitrogen and undermanuring with potash. In the third place, variety and climate set definite limits to yield. Farmyard manure should be the basis of all potato manuring, since it increased the air and moisture supply of the roots. It was best applied in the autumn, as it then had time to rot and supply this air and moisture in the spring. Trials were wanted, however, to determine relative values of autumn and spring applications. Investigations were proceeding with regard to the value of the green manuring as a substitute for dung.

As regards artificials, it could safely be said in general that 1 cwt. of sulphate of ammonia would increase the yield of potatoes by one ton per acre; at Rothamsted good returns had been received to applications as high as 3 cwt. Superphosphate improved the root action, but it was not essential for the English crop on all soils. An ample supply of potash was important for yield, health and quality of crop. Sulphate of potash in general was better for quality than chloride of potash.

Mr. J. C. Wallace, Agricultural Organizer for Holland (Lincs), described his experiment on the silty "Fen" soil of that country, while Mr. R. W. Wheldon, of Armstrong College, Newcastle-on-Tyne, dealt with experiments at six centres in the North carried out by that College, chiefly as regards comparative effects of sulphate of ammonia and potash on the one hand and chlorides on the other. The sulphates produced earlier and longer growth. He concluded that 3 cwt. sulphate of ammonia and 3 cwt. sulphate of potash could profitably be used in the North.

Mr. T. Eden, of the Rothamsted Station, spoke of the Station's results. His general conclusions were that dung was beneficial to the yield, but not so much to quality, except where low-grade potash salt were included in the atrificials; that potash paid well in most forms, except as very low-grade salts; and that nitrogen always paid up to certain limits.—*The Chemical News and Journal of Industrial Science*, Vol. 131, No. 3425, Friday, December 14th, 1925, pp. 359-60.

IV

Live-Stock Improvement Scheme.

The Live-Stock Scheme comprises a great deal beyond interesting the farmer in the use of a good sire and, as regards his cows in the keeping of milk records—which are the two main principles of the scheme. To educate the farmer so that the selection of good animals for breeding becomes not only a capability but a habit; to make suitable feeding an intelligent custom instead of a tedious theory; to foster a willingness to incur initial expenditure for the sake of ultimately better returns; in short, to demonstrate all the correlated requirements of "grading up" and the commercial soundness of them; these are objects which must take several years to accomplish, but toward which the Live-Stock Scheme may fairly be said to be making good progress.

Bulls.—The Bull Scheme has continued to be popular, and with the relaxation of foot-and-mouth disease restrictions, which hampered development in the preceding year, satisfactory progress has been made.

The total number of bulls actually located for service during the year ended 31st March, 1925 (*i.e.*, continued from the previous year with

renewed grants or provided for fresh districts during the year), was 1,069, an increase of 91 on the preceding year.

BULL SCHEME.

(Showing the number of bulls subsidized each year since the commencement of the Scheme.)

Year 1st April—31st March.	Societies.	Individuals.	Total No. of Bulls.
1914—15*	369	43	497
1915—16	489	28	633
1916—17	543	15	659
1917—18	578	14	710
1918—19	604	7	721
1919—20	568	6	675
1920—21	561	6	668
1921—22	726	3	847
1922—23	831	1	947
1923—24	840	1	978
1924—25	916	1	1,069

The Bull Scheme is beginning to have a marked effect in districts where it has operated for some time. The improvement effected in the quality of stock reared continues to be proved at markets and sales, and the introduction of special classes at shows per premium bulls and their progeny is an encouraging recognition of the scheme. A good instance of this was provided at the Yorkshire Agricultural Society's Show in July, 1924, at York, where arrangements were made for a special class for premium bulls. Twenty bulls were entered and eighteen were shown. The class was reported as being very strong, not only as regards the number but also the quality of the bulls shown, and constituted in the opinion of many the most interesting feature of the show. Considerable interest was created among local breeders, and it was decided to provide for a similar class at the Society's next show. It was worthy of mention that three of the bulls shown were themselves the progeny of premium bulls. Another example was provided at an agricultural show at Bakewell, where a group class was organized in which premium bulls were shown with two each of their progeny. Nine such groups came before the judges, and this feature of the show was reported to be a great success.

The effect of these and other similar demonstrations of the quality of stock used under and produced by the scheme is considerably enhanced by the successes obtained by premium stock in the open classes at shows throughout the country. These happenings are not without effect on

* Including the period 1st February, 1914—31st March, 1914.

the minds of farmers who have not hitherto given the scheme a trial, and the Ministry's Live-Stock Officers are able to report a growing interest in the selection of bulls used, often outside the scheme, and while in many districts there is still a regrettable lack of care in the breeding of live-stock, the conditions to-day, as compared with those in existence before the inauguration of the scheme, are, on the whole, distinctly promising. A further indication of an awakening interest in live-stock breeding and the use of a good sire may be found in the more frequent representations which are being made to the Ministry with regard to the question of eliminating the scrub bull. The Ministry is fully in sympathy with the object of these representations, and when it has sufficient agricultural support it will be prepared to proceed with the necessary legislation. Some such action would seem to be necessary in the future, as the Ministry's scheme, though it is doing good work in the desired direction, is very limited in its scope by reason of expense. The magnitude of the task will be easily appreciated when it is remembered that the number of bulls subsidized by the Ministry is about one thousand as compared with the total number of bulls in the country, estimated to be about 82,000.—The *Journal of the Ministry of Agriculture*, Vol. XXXII, No. 6, September 1915.

V

Cora Grass, ***Cyperus Rotundus,*** **Sinh.** ***Kalanduru.***

"Cora" which belongs to the sedge family is, in districts where it has become established, one of the most pernicious weeds to be met with in Ceylon.

The plant sends down slender underground stems on which, at widely separated intervals, are found the "nuts" by which reproduction is effected. These "nuts" are found in the soil at depths up to two feet. The plant is used to a considerable extent in native medicine.

"Cora" has long been firmly established on the Experiment Station, Peradeniya and no thoroughly satisfactory method of eradication has yet been devised.

Up to the present the methods tried may be divided into—

(1) Shading out with high shade.

(2) Smothering out with a low-growing cover crop.

(3) Constant scraping of the soil to cut off the leaves as they appear.

(4) Forking out.

(5) Sowing mustard in infested patches.

(6) Smothering the weed with coconut husks.

Table showing *calculated* yield of paddy from various plots during 1924—28:—

Plot No.	Area in guntas	Yield of grain in seers per acre			
		1924—25	1925—26	1926—27	1927—28
1	74	789	900	897	1,270
2	50	1,085	957	1023	1,228
3	44				
4	74	1,073	1,163	1,097	1,267
5	74	969	1,173	1,187	1,391
6	41	569	1,105	1,013	1,475
7	22				1,620
8	41				1,300
9	41	968	1,114	1,150	1,238
10	48	867	1,008	1,058	1,094
11	35	782	1,074	1,099	1,121
12	33	722	943	909	1,278
13	49	831	1,029	842	1,249
14	23	978	1,120	1,008	1,346
15	22				1,227
16	41	943	878	872	1,221
17	20	477	916	864	1,188
18	32		755	1,130	1,552
19	82	547	813	927	1,335
20	42				1,069
21	20	460	648	636	1,230
22	58		476	712	1,175
23	32		720	773	1,157
24	30		669	891	1,423
25	64				
Average for the whole area		878	924	964	1,267

An article by Mr. N. A. R. Pollock, reprinted from the *Queensland Agricultural Journal*, appeared in the *Tropical Agriculturist* for April, 1925. Many of the measures mentioned entail rendering the soil unfit for crop production for a considerable period. Other measures show more promise but an economic method applicable over a large area does not yet appear to have been discovered in Queensland.

A Ceylon Planter claims to have completely eradicated "cora" in small patches by folding pigs on the land. This would hardly, however, be a practical measure in tea-land.

The experience of the Experiment Station, Peradeniya, may be summarised as follows :—

1. "Cora" can be controlled by shade but the shade must be dense and permanent, or at all events it must be maintained over a considerable number of years.

2. Constant scraping off of the leaves of the weed would probably result in its ultimate destruction, but the treatment would have to be maintained for a considerable number of months and would not be practicable over a large area.

3. Forking out is never completely successful.

In Ceylon in most cases the land to be treated is occupied by a permanent crop and the effect of any measure on the main crop must be considered. Probably the most promising solution is the smothering out of the weed by the planting of a creeping leguminous cover crop suitable to the district concerned, though even in this low covers a few cora plants will usually make their way through. The behaviour of tea under such a crop in Ceylon has yet to be ascertained. It is intended next year to plant up a considerable area of tea on the Experiment Station much of it infested with cora—with *Indigofera endycaphylla*. From this valuable experience should be gained both in the measure of success achieved and the time taken in smothering the cora, and in the effect of the treatment on the tea.—*The Tropical Agriculturist*, Vol. LXV, No. 3.

VI

The Influence of a High Grade Bull on a Dairy Herd.

G. S. Henderson, N.D.A., N.D.D., *Imperial Agriculturist.*

An interesting article on the above subject is published in the "Agricultural Journal of South Australia" of March 16th, 1925. It is pointed out how valuable are highly prepotent bulls on the milk production of a

dairy herd. It is very truly stated that most breeders have had the experience of discovering the stud value of an exceptional sire after the said animal had gone beyond recall. The figures of milk yield of the progeny of different bulls from the Roseworthy Dairy Herd in South Australia show very clearly the powers which some bulls have in transmitting milking qualities to their offspring. Sufficient care and attention is seldom given to the necessity of retaining sires until it is shown that they can hand down the milking characteristics to their progeny. It does not seem to be realized among breeders that having got the desired animal its characteristics must be retained and developed in the herd by in-breeding.

With the early maturing foreign cattle it is necessary to wait a considerable time before definite results can be obtained, but with the much slower maturing Indian Dairy cattle the time required is much longer. Cattle-breeding in India on modern lines, with the keeping of proper records, has only been carried out in very recent years and almost entirely by Government agencies. When it is realized that any policy in agriculture in India is very unlikely to have any considerable period of continuity owing to the continuous change of personnel in Government posts, it will be manifest that progress in cattle-breeding in this country is beset with many difficulties. Some of these difficulties in breeding operations in India are :—

1. Indian cattle are about two years later in reaching maturity than improved foreign cattle.

2. They are accustomed to suckle their calves. At Pusa it is very difficult at first to get the calves weaned at birth.

3. They do not breed so regularly as improved foreign cattle, so a big proportion of the milk herd is always a heavy charge as the cows spend so long dry.

The milking results of the progeny of two bulls have been worked out from the Pusa Dairy Herd. These are Sahiwal cattle, the original stock being brought from the Punjab. This is about the best dairy type in India, but the cows present considerable differences from the improved dairy cattle as evolved in Europe. 4,000 lbs. of milk in a lactation period of ten months represents a standard fully as good as 9,000 lbs. of yield of an improved foreign dairy cow.

The record of the 11 daughters of Prayagi, still in the herd, is given below. All lactations are for ten months.

TABLE I.

Showing the influence of sire Prayagi on the milk-producing qualities of his progeny:—

Name and number of cow		Best lactation	Dam		Dam's best lactation	Increase or decrease in milk yield
		lbs.			lbs.	lbs.
1. Ashrafi	211	4,670	Panji	39	4,665	+ 5
2. Chakli	203	4,317	Padmini	56	4,094	+ 223
3. Akli	231	5,046	Raseeli	132	4,812	+ 234
4. Jamali	237	4,420	Divali	77	3,827	+ 593
5. Deoki	213	5,349	Gomti	75	3,346	+2,003
6. Chabili	187	4,729	Rami	78	3,764	+ 965
7. Parbati	245	4,037	Rajni	76	4,867	— 830
8. Gopi	219	5,121	Foorsi	103	320	+4,801
9. Soonehri	248	4,223	Makhni	28	4,407	— 184
10. Kadambari	243	6,347	Jardi	47	4,979	+1,368
11. Abadi	238	4,624	Durgavati	136	3,139	+1,485

It will be seen that the two cases of decrease in milk yield still keep the daughters' yield above 4,000 lbs. which is an excellent yield for an Indian cow.

The next table shows the influence of a bad sire. Out of 10 daughters of Himmat, all except one proved to be very bad milkers even in the second lactation.

TABLE II.

Showing the influence of sire Himmat on the milk-producing qualities of his daughters:—

Name and number of cow		Best lactation	Dam		Dam's best lactation	Increase or decrease in milk yield
		lbs.			lbs.	lbs.
Hanumati	399	4,848	Kaveri	133	4,786	+ 62
Himmati	348	1,728	Gomti	75	3,346	—1,618
Goli	305	410	Mootki	122	3,435	—3,025
Hasni	339	2,620	Imani	138	6,200	—3,580
Halia	393	1,619	Imani	138	6,200	—4,581
Rati	358	1,445	Dhoonki	181	3,240	—1,795
Haldi	379	3,064	Chakli	203	4,317	—1,253
Hundi	383	3,624	Kapurni	283	3,195	+ 429
Hathia	386	1,324	Radhia	279	3,520	—2,196
Hisli	353	675	Thakrani	250	3,923	—3,248

The above examples show very clearly that the influence of the sire, for good or for evil, in the dairy herd is a fundamental question.

Two sons of Prayagi were used in the Pusa Herd—Thakur and Khelawan. Thakur has shown himself to be an exceptionally prepotent sire. A few of his heifers were close on 5,000 lb. in their first lactation. His

brother, however, has not given such good results. All these bulls were cleared out of the herd long before their importance was known, but in-breeding with their descendants to get as large a propotion of the required blood as possible is being carried out at present. To get bulls containing a large proportion of this blood will mean considerable time and continuity of policy which is rather too much to be hoped for under present conditions.—*The Agricultural Journal of India*, Vol. XX, Part V, September, 1925.

VII

The Coffee Borer.

A Coorg Planter asks us whether, in view of the absence on furlough of the Scientific Officers of the U.P.A.S.I., and of the fact that the Government Entomological Section at Coimbatore has never intensively investigated the Coffee Borer pest, it would not be possible for us to attempt a resume of the information on the subject which has appeared in *The Planters' Chronicle* from time to time in by-gone years. The volumes of this paper which did deal with the Coffee Borer belong, he points out, for the most part to a past decade, and are therefore unlikely to be found on very many Superintendents' office-tables to-day. Most of the other publications on the subject seem also to have been written many years ago and to be in most cases long since out of print. In these circumstances we endeavour to comply to the best of our ability with our Correspondent's request.

The earliest reference to the subject which we have been able to trace appears in a report (published by Messrs. Higginbothams, Ltd.) made by Mr. John Cameron, F.L.S., Superintendent of the Mysore Government Gardens, on a visit which he paid to Coorg in 1898-1899. This gentleman suggested five remedies ; but, of these, the fifth and possibly the fourth appear to be the only ones which mortals on any particular estate can command at any particular time. Firstly, secondly, and thirdly he states that particular attention should be given to depth of soil, adequacy of moisture, and the presence of insectivorous birds such as woodpeckers, jays, thrushes, mynas, hoopoos, sparrows, larks, crowpheasants and jungle fowl. Fourthly he commends a sufficiency of shade and lastly the application of neem in the form either of cake applied to the soil or of oil poured into the holes which the insects bore.

Next in order of date of publication in book form (though probably not of compilation) comes the chapter on the pest contained in "Science and Coffee" by the late Mr. William Pringle, M.S.C.L., some time

Agricultural Chemist in Coorg to Messrs. Matheson & Co., which originally appeared in *The Madras Mail* and was republished in book form in 1907 by the Minerva Press. The pamphlet mentions that Dunning called the Coffee Borer Larva *Clytus coffeophagus* and suggests as preferable *Xylotrupes coffea indica ;* but both these appellations have now, we imagine, been superseded permanently by *Xylotrechus quadrupes* which designates scientifically the genus and species to which the Borer belongs. Mr. Pringle found that the eggs if maintained at a temperature of 80°F to 90°F, produced Larvæ in about ten days ; and that, as the temperature was lowered, the devlopment of the egg was retarded (very appreciably below 65°F.) until at a temperature of 36°F., all of them died within twenty-four hours. These experimental findings would of course explain the remedial value of shade ; which retards the development of the eggs and therefore increases the probability of their being washed off the trees by the rain. So far as Coorg is concerned, they seem to have been corroborated by the author's actual observations ; for he found that the maximum incidences of the Larvæ were in May and October when the temperature was seldom if ever below 65°F. and that the minimum incidences were in February and July when the temperature falls to round about 50°F. Another interesting experiment was conducted to show the effect of moisture on the development of the eggs. Twelve borer trees were chosen on May 13, 1888. In the case of four the soil and also the tree itself were kept constantly damp ; in the case of four the soil only (but not the tree) was kept constantly damp ; and in the case of four both soil and tree were kept quite dry. When the trees were cut open on September 9, 1888, it was found that the average number of eggs per tree which had developed upto or beyond the Larvæ stage in each of the three categories was respectively 5.75, 17.75 and 51.50 ; thus indicating that though felled trees may not develop many beetles during the monsoon when they remain damp, they will certainly do so if they are allowed to stay on the ground after the weather has become dry.

It may now be opportune to summarize the account given by the author of the life cycle of the pest. In about ten days the Larvæ are hatched from the eggs which the beetle deposits in a crevice of the bark on the sunny side of the tree, and in twenty-four hours they have found their way underneath the bark. There they burrow for the next four months about $\frac{1}{4}$ inch below the bark, eventually emerging into the pupa stage. After a month's 'hibernation' they are metamorphosed into the beetle form in which they make their way out to the surface of the tree.

On page 480 of *The Planters' Chronicle* for 1913 an illustration of the beetle was reproduced, to simplify identification by planters who, it was

suggested, could have the beetles collected by hand in March and October from the stem of the bush just above ground level, and killed before they had a chance of laying eggs. On page 508 of the same volume Mr. A. G. Nicholson wrote to say that he had obtained excellent results from scrapping the stems of the trees, and covering them thickly with a white wash made from fresh shell lime.

On page 343 of *The Planters' Chronicle* of 1915 Mr. R. D. Anstead endorsed the latter treatment ; and suggested as an alternative painting the stems and primaries with a mixture of either equal parts of kerosene oil and tar or of one part of Jeyes fluid and fifty parts of water. The same authority on page 366 of this volume said that good white washes could be made from seven pounds of washing-soda and two pounds of quick lime dissolved in ten gallons of water or from a quarter bucket of quick lime, a double handful of salt, and a lump of tallow—the size of one's fist—thoroughly dissolved in water, which should be added until a suitable consistency was obtained. On page 396 of the same volume Dr. Leslie C. Coleman wrote that it was of the utmost importance to ascertain (*a*) whether there are regularly two important broods of the borer each year, (*b*) whether the Coffee Borer attacks any other tree and (*c*) whether Coffee is attacked by any other borer (except of course the well-known red borer—Larva of a moth—*Zenzora coffeæ*).

In 1916 speaking on August 10 at the Twenty-Third Annual Meeting of the U.P.A.S.I., Dr. Leslie C. Coleman announced that he had come to the conclusion that the 'two-brood' theory was more or less legendary and that only the autumn brood need be taken into account. He mentioned that the coffee borer had been found on one other tree which was common in the Coffee District and which was called *Kullasudli* by the Kanarese. He discountenanced the lime washes so strongly recommended in the past, and thought that the success which had been attributed to their application was, in reality due to the fact that scrapping operations had been carried on at the same time. This scrapping and scrubbing, which should be done in October to December, was, he said, the only remedy he could with any confidence suggest ; and it should not only eliminate the beetles which were just emerging, but also destroy large number of eggs as well.

On page 579 of *The Planters' Chronicle* for 1917 was published Dr. Coleman's pamphlet on 'How to Combat Coffee Borer' which we reproduced in our issue of last week, and which details the scrubbing remedy which he had advocated at the general meeting in 1916.

Four pages in the Report of the Proceedings of the Second Entomological Meeting held at Pusa in February 1917 (published by the Superintendent, Government Printing, Calcutta—1917, price Rs. 3) contain a

verbatim report of a discussion on the pest in which Mr. T. Bainbrigge Fletcher, the Imperial Entomologist, Mr. R. D. Anstead, the Deputy Director of Agriculture, Planting Districts, South India, Dr. Leslie C. Coleman, the Director of Agriculture, Mysore, and Mr. K. Kunhi Kannan, the Senior Assistant Entomologist, Mysore, took part.

Mr. Fletcher mentioned that there were really three boring pests : The *Xylotrechus quadripes*, the *Zeuzera coffeae*, and the *Collyrines ;* but that the ravages of the two latter kinds were negligible in comparison with the devastation wrought by the first. Dr. Coleman said that he had discovered that the borer fed not only on coffee but also on a tree known as *Olea dioica* which we presume is identical with the *Kullasudli* which he mentioned at the U.P.A.S.I. General Meeting in 1916. Mr. Fletcher stated that on account of their scarcity neither parasites (of which two Hymenopterans had been discovered) nor birds (such as the Blue Barbet) could act as a very effective check : and that chemical deterrents were of even less use. He attributed the fact that rain at the egg-laying period ensured a considerable reduction in the number of beetles during the forthcoming season, not so much to the rain washing away the laid eggs as to the rain impeding oviposition, since the female beetles only flew freely on warm and sunny days. Incidentally we may note that it appears that whenever the female really gets going she can be relied on for no less than one hundred eggs ! Mr. Fletcher concluded by saying that he strongly advocated the catching by hand of the adult beetles ; and that his experiments in Coorg in 1915 enabled him to assert that the difficulty as regards identification of the beetle which had been experienced by Mr. Kunhi Kannan and by Mr. Anstead could readily be overcome if only the catchers were properly taught. Mr. Kunhi Kannan asserted that the pest retained its larva form for almost twelve months : for or more than double the period which Mr. Pringle had computed some thirty years before.

At the general meeting of 1920 Dr. Coleman again advocated rubbing and scrubbing in October—December. He was able to supplement this advice with the information that (judging from the experiments he was pursuing) a chemical called 'Brunolinium' painted on the stems in December—January, should prove capable of penetrating into the burrows and killing the young grubs.

The Planters' Chronicle of September 13, 1924, contains a circular by Mr. Kunhi Kannan which describes the excellent results attained in beetle-catching experiments on an estate near Saklaspur. Only 540 trees had to be removed in the five-acre experimental plot, as against 1,139 trees in the adjacent check plot. The circular concluded by stating that

the Mysore Agricultural Department was prepared to furnish trained supervision for beetle-catching campaigns on a limited number of estates in the State, and would even be glad to send full instructions regarding procedure and labelled specimens (both of the Borer Beetle and of similar beetles with which it might be confused) to the Superintendents of Coffee Estates outside Mysore.

Last year too Mr. R. D. Anstead as Director of Agriculture wrote to Mr. D. G. Munro, then Deputy Director of Agriculture, Planting Districts, that for some unexplained reason Borer attacks seem to come in cycles of years, and asked him to investigate the matter, and report. In pursuance of this letter Mr. Munro obtained from Major Fraser—the Civil Surgeon in Coorg—the opinion that the cycles were caused by the incidences of parasitic enemies. When these were numerous the borer was suppressed, when the borer was suppressed the parasites in their turn decreased, and when the parasites decreased the borers came once again to the fore only to act in due course as 'hosts' for a fresh parasitic horde. Owing to Mr. Munro's departure on furlough however this branch of the investigation has not yet been further pursued.

This precis will doubtless enable a reader to say 'Now "I" know where flies—or rather beetles—go in the winter time'; but we fear it will not tell him how to prevent their going there any more. Scrubbing and beetle-catching alone appear to have found general acceptance as deterrents, and we have been able to get no information as to the final results of the experiments with 'Brunolium' which Dr. Coleman undertook.

Perhaps some Superintendent who is not too 'bored' with the whole subject will put Chronicle readers in his debt by describing any preventative operations which in his own experience have attained even a modest measure of success.—*The Planters' Chronicle,* Vol. XX, No. 47, November, 1925.

VIII

The Coffee Borer.

Dr. K. Kunhi Kannan, m.a., Ph.d., *Entomologist, Department of Agriculture, Mysore.*

Having been out on tour I was not able to see until my return a couple of days ago, your admirable *precis* (pages 857, *et seq.*, issue of November 21, 1925—*Ed.*) of the information regarding coffee borer that has appeared from time to time in the issues of the *Planters' Chronicle.* In view of the renewed interest in the pest which the article will have stimulated among your readers, I feel it necessary to furnish them through your columns

with a brief summary of the investigations carried on in the Entomological Section of the Department of Agriculture, Mysore. The work was commenced in 1915 along with that of Green bug which appeared in Mysore about that time ; and has continued ever since off and on whenever the limited staff of the Entomological Section found time to spare from more urgent work.

A great deal of information has been gathered both from field observations and experiments ; but has not been published in the hope that a definite announcement as to the most successful line of control could be made before long. In the meanwhile the more important results have been published from time to time in the reports of the Entomological Section and in circulars of which two at least have been published in the *Chronicle* as well.

The line of control that was first recommended by this Department is that of scrubbing the coffee stems. This was suggested by the habit of the female beetle of laying eggs beneath the scales on the bark of the tree, where the legless grub on hatching can get sufficient hold to penetrate into the bark. In the absence of these scales, the beetles cannot find secure lodgement for their eggs which are not bathed in any copious secretion for attachment to the stem. The operation was to be repeated after a fortnight to destroy such eggs as were laid in spite of the first scrubbing and to make the removal of the scales more thorough. Adult beetles found in the course of the work are also picked and destroyed. This recommendation has been followed on several estates ; and one Muhammadan planter who owns several thousands of acres of coffee reported to me recently that he has obtained uniformally excellent results.

To many planters however the provision of labour for this additional item of work on the estate in the last quarter of the year—when besides other work there is coffee picking also to be done—is a serious difficulty in the way ; and consequently an attempt has also been made to find other remedies. One of these was a wash made out of a tar product applied to the stems soon after the picking season was over. This remedy was based on the habit of the young grub of making its initial tunnels superficially in one or two rings round the stem and not getting deeper into the wood until two to two and a half months after hatching. The droppings in these superficial tunnels are usually loosely packed and any chemical could easily penetrate through them as far as the grub, where the fumes diffusing round would choke and finally kill it.

The chemical did all that was expected of it and the results from preliminary trials were very encouraging. Unfortunately in the third year, its application to trees (apparently for the most part weakened by

stump rot) adversely affected them ; and it was suspected that the chemical was not identical with the supplies used on the two previous occasions. The surmise was soon confirmed by similar results with the chemical obtained in the United States. The subject was taken up with the manufacturers for supplies of a uniform chemical standard but this was apprently impossible as the chemical was no more than a crude tar distillate. It was therefore decided to seek other lines of control and in 1923 two methods were tested : one wrapping the trees with date palm strips and the other picking the adult beetles. Both were fairly good ; but while wrapping was found to answer well it was observed many trees could not be satisfactorily wrapped and furthermore there were difficulties in getting supplies of the wrapping material in sufficient quantity. The cost too was high. Thus picking of beetles was found easier ; and the results, as I have shown in my circular referred to in your precis, were very encouraging. As a result of handpicking in the first year of experiment, against 1,139 trees pulled out in the check plot of 5 acres only 540 trees were removed from the experimental plot of the same area. In the succeeding year 1924 work was done on two estates and the results obtained are tabulated below :—

Estate	Total acreage	Acres handpicked in 1924	Beetles collected in 1924	Number of trees pulled out from the entire estate in		
				1924	Expectation for 1925	Actual for 1925
A	50	8 acres	6,231	15,541	18,649	10,032
B	200	5 „	2,000	19,400	23,280	18,070

It will be noticed that the results are shown for the whole estate and not for a check plot of the same size as the experimental plot. There is good reason to believe both from the movements of the beetles and other factors that the effect of picking is not local to the plots and its immediate neighbourhood but on the estate as a whole. The reduction in the total of trees may appear small but has to be considered in the light of two important facts, (1) that the area picked was but a fraction of the total area in each and (2) that according to figures supplied of trees pulled out in the estate in the neighbourhood the figures for this year in both the estates must have been at least 20 per cent more than the last year's figure. The actuals in the last column have to be compared with the figures which normally should have been expected, to realize the full benefit of handpicking. To take the estate 'A' where 8 acres out of 80 were handpicked

the reduction from 15,541 trees in 1924 to 10,032 in 1925 when the expectation was 18,649 is substantial and when it is remembered that the cost was no more than Rs. 80 for the season for the 8 acres the remedy appears certainly practical and cheap. The savings effected are equivalent to the saving from entire destruction of 7 acres of coffee which at a very low estimate may cost anywhere from Rs. 2,000 to 3,000.

In the light of these facts there can be no doubt that picking promises to be a simple way of controlling the pest which requires little technical skill and not more than Rs. 10 per acre for the areas to be handpicked which are usually confined to the sunny patches.

This year the work has been extended in area on estate 'A'. 35 acres out of 50 acres have been gone over with a result so far of 5,592 beetles. Another estate of no more than 20 acres has had the entire area handpicked in order to determine more accurately the distribution of the beetles according to shade and other factors. Three thousand and seventy beetles have been caught on this estate. It is proposed to carry the picking work on this isolated estate for at least three years to see how far the pest can be eradicated.

Labour difficulty exists to a certain extent in regard to this remedy also, but not so much as to deter the planters from what is after all a very simple operation. In the first place there does not appear so far to be any necessity for going over the entire estate, secondly the beetles being active during the warm hours it is very likely that picking need be done only in the afternoon, the mornings being devoted to the routine work of the estate.

Before passing on, one important fact should not be lost sight of. It is only the experience gained on estates in Mysore that has been set forth above. What the behaviour of the beetles is, in other parts of the coffee-growing area in South India, how different conditions of shade, of rainfall and elevation modify it, has not been ascertained. It is impossible to say before information on these points is obtained whether handpicking can be practised in those areas. In spite of my circular on the subject inviting planters outside Mysore to try the remedy none has yet made a trial.

Besides handpicking, there are one or two other methods to which it is proposed to give a trial. One is applying a sticky wash which will retain its property for two months so that beetles which pass along the stem or their egg-laying apparatus will be entangled. Another is to dust the trees with a suitable poison which will be swallowed by the young grub while penetrating and kill it. Both these, however, are likely to be

far more expensive than handpicking and it may after all be that the last may prove to be the most practical of all the lines of control.

One other line of control is the introduction of parasites that attack the borer. This method has been under trial in Cochin-China but it is yet too early for definite results. If the method is found effective there, then, it will be time to consider its adaptability to this country. In the meanwhile an attempt is being made to obtain the parasites that undoubtedly exist in South India. Several specimens have been already obtained, but in fragments ; but attempts will continue to be made to secure entire specimens and identify them. If the parasites from South India are identical with those now being tested in Cochin-China there is little to be gained by importation. If they are different their introduction may prove distinctly beneficial.

In conclusion, I should like to assure coffee planters that everything is being done to complete the investigation of the pest and that as soon as all the results required are available a bulletin will be issued on the subject. In the meanwhile, I would request them to furnish me with the records as far as they are available of rainfall and of trees pulled out from their estates. The wider the area from which these statistics can be obtained and the longer the period covered by them the more correct will be the interpretation of the observations and experiments made here.—*The Planters' Chronicle*, Vol. XX, No. 51.

IX

Paddy and Pasture.

A. GALLETTI, I.C.S.

A

"In a land where all the soil is wanted to grow food for the people, or crops which they can exchange for food, how can rich pastures be found?" asks the *Statesman*.

There are other lands where all the soil is wanted to grow food for the people or crops which they can exchange for food. There is a peninsula in the West that has been known for 2,000 years as *magna parens frugum*, great mother of food-crops, and the poet who called her this also wrote at length of *fortes ad aratra juvencos*, bullocks strong to the plough and knew how they should be fed "not only on wild grass and willow leaves and sedge of the swamp, but pick also for them corn sown by the hand". This poet was bred in the great plain of north Italy, intersected

by many rivers, swampy land of irrigated crops, a land of canals and channels—*claudite jamrivos, pueri, sat prata biberunt*, now close the channels, the meadows have drunk enough.

This is the country, the irrigated Lombard plain, from whose experience I would answer the *Statesman's* question. We irrigate the meadow there as well as the paddy-field. We still keep there bullocks strong to the plough and cows that yield 1,000 seers of milk a month. We sow fodder-crops for them by the hand. We devote half our land by rotation to pasture for them.

When paddy was first introduced and grown year after year in the same fields, the cattle had to be driven away to the hills in the summer, which is our season there for the growing of paddy. But sowing paddy year after year in the same fields has been given up long ago. "Rotation paddy-fields are far more productive than the stable paddy-fields," says an Italian text-book, "and their productive capacity is great in proportion to their freshness." Numerous varieties of rotation are given in the text-books, varying from three to ten years. Half or less than half the years will be paddy years and even for those years you are advised to vary the kind of paddy and not grow the same every year. In 1921 I visited the Italian Government's great experimental paddy station at Varcelli and the head of it gave me the following as common and ideal rotations :—

Common.—

(1) 3 years paddy. One year dry cultivation with wheat or oats ; meadow sown in the cereal while it is growing and then it remains meadow for a year or two ; after the meadow sometimes maize.

(2) For heavy soils. 1 year paddy. 1 year wheat and oats. 1 year meadow.

Ideal.—2 years paddy. 1 year dry cereal. 2 years meadow.

Advantages of Rotation.

If paddy is only grown one year in three or two years in five, you divide up your paddy land into three parts or five parts and each year are using two-thirds or three-fifths of your land for other crops, mostly grass, tre-foil, lucerne which cattle eat or oats, which are also only animal food in Italy. The greater part of your paddy land will accordingly be producing all the time food for your cattle and it is no wonder that the Lombard ploughing-bullock is a sleek, well-fed animal four times the weight of the little, starved, abortions used in India, and the average Lombard cow yields, I am afraid to say how many times as much milk, of better quality, than the Indian. When I went over the paddy-farm of Cav. Stabilini near Milan not long ago it was his cows that he was most anxious to show me and he told me that he made much more by them than by his paddy. He

sends his milk, his butter, his cream, his cheese into Milan. The paddy farmer of Bengal has no milk or cream or butter or ghee to send into the great market of Calcutta, which would so willingly pay him high prices for pure products of the cow. Cav. Stabilini's cows not only have beautiful meadows and lucerne and clover hay made for them and corn but palacial stables and all the latest appliances for cleaning and milking. Where the cow is a valuable possession she is tended with care and love, and crops are grown for her and palaces are built for her. Where she is merely an object of veneration she is left to stand and starve in the public standing and starving grounds which are miscalled grazing grounds in India. India should abolish these places of torture and breeding grounds of disease and abortion and every Indian should devote three-fifths or two-thirds of his land to growing grass and fodder for his cattle.

I assure him he will not be a loser. Apart from the fact that the milk crop at any rate, near large centres of population, is more valuable than the paddy crop and better food, rotated and manured paddy will yield him two or three times as much as unrotated and unmanured. I do not think the soil or climate of Lombardy are superior or even equal to those of the Deltas of the Ganges, the Godavari, the Krishna or the Cauveri for paddy growing. The season in Lombardy when it is hot enough is so short that it is with difficulty they can scramble out one crop a year. But what are the figures for the yield ? The official figure of the average yield in North Italy is 45 quintals a hectare equals 4½ tons equals nearly two tons per acre. The official figure for most parts of India is well below 1,500 lbs. an acre. In my own district of Ganjam, where one million acres are cultivated and there is nothing to be seen but paddy, the yield is about 1,200 lbs. If we reduce the acreage to 400,000 acres taken in rotation and manured properly and weeded properly, as they do in Italy, and got a yield of 4,000 lbs. an acre instead of 1,200, the 400,000 acres would yield one-third more paddy than the million acres do now and we should have in hand 600,000 acres on which to raise crops of grass and fodder for the cattle or wheat or maize and other crops for them.

The official estimate of 45 quintals a hectare for Italy is only the average. The standing crops I saw in 1921 on the farm of one Signor Rossi near Milan was estimated at 60 quintals and 70 and 80 quintals are sometimes obtained.

It need not be supposed that irrigable land is not fit for meadow. In Lombardy they use the same land in rotation for paddy and meadow. They irrigate the meadow once in 20 days or so.

In the Italian estates some land is usually reserved for permanent meadow. It is irrigated summer and winter and the ice that forms on the

surface is broken up by alternately withdrawing and adding water. These permanent meadows are arranged on a slope so that water passes from one to another; each plot is further sloped from the centre and the water falls into side channels, which carry it to other plots. Cav. Stabilini showed me his permanent meadows (marcite) and said that, labour being now so dear, it would never pay now to form the meadows and plots but it was all done long ago.

But such are the extraordinary efforts made in Italy to provide pasture when the season is least propitious.

B.

In the last article I showed how the rotation of crops had solved the problem of pasturage in Lombardy. My facts and figures are correct, but I have given them often before and am not aware that they have made any impression on anyone. People only believe what they see themselves.

But after all it is not such a far cry to Milan and more and more Indians, as well as Anglo-Indians, pass through Lombardy every year now. From May to August they will see the paddy growing if they look out of the windows of the train; in May they will see women bending over and transplanting just as they do in India; when the rice is young they will see the week's "drying" or total removal of water, which is not practised at all in India; they will see constant weeding also by women, which is hardly practised at all in India; they will see how well and neatly the bunds are laid and kept and how the water is guided and regulated within the beds which is not done in India; and how only a measured quantity of water is used. But it will be better to get out at Milan and arm onself with an introduction and go and see a paddy farm.

An Italian rice estate is strikingly regular. The paddy fields are exact parallelograms, all the bunds and channels are perfectly straight, and the larger bunds are all planted regularly with trees. The fields are kept beautifully clean either by employing an army of female weeders or by a new method, of which Signor Rossi informed me. He sows with a special instrument which makes small furrows and deposits the seed on the ridges between. The result is that the weeds get drowned while the paddy springs up. Forty days after sowing he passes another special instrument down the furrows to exterpate such weeds as may have come up. His fields were quite remarkably clean. This system is known as the Cabrini system after the inventor and is a recent invention. Signor Rossi said he would be very pleased to show it to anyone from India (sowing season is end of April).

All the Lombard paddy-growers use chemical manures profusely. No general advice can be given, but there can be little doubt that the

profuse use of chemical manures combined with rotation of crops and clean weeding contributes to the high Italian yields.

The visitor may see the regular paddy-fields, the special instruments and the manures. But let him also look at the meadows, both summer and winter, and convince himself that three-fifths to two-thirds of the land that could grow paddy is devoted in rotation to meadow and dry crops.

Good Rice and Fine Cattle.

If the Indian visitor goes to Ravenna—a place well worth visiting for itself—let him also study the paddy growth at the mouth of the river there. It is a country of fine cattle and good pasturage and the chief crop he will see is lucerne. Paddy is grown not so much for its value as because it is the only suitable crop pending the silting up of the soil. When the soil has risen sufficiently, wheat takes the place of paddy. The common rotation there is 2 years paddy, then 2 to 5 years lucerne ; so that 5/7ths of an estate may be under fodder and only 2/7ths under paddy. Indian conditions are very nearly reproduced there ; the flat, swamp country is not unlike Bengal ; paddy is not cultivated with care or much manured and made to yield much ; but even there, though the population is thick and men must eat, more land is devoted to food for cattle than food for men ; and there too the cattle put all Indian cattle to shame.

The Indian is not cruel to his cattle, but very, very callous. He will not give up one inch of his land to them. He wants it all for himself. He will only stall-feed a very few and leaves the rest to multiply without limit and then to starve down to the limit that the public pastures can sustain. He takes no thought for what they will do in the hot weather when there is not even the scanty grass of the public pasture and the rocky jungle-hills and never dreams of cutting grass and making hay-stack. In India we have only the straw-stack stuff fit for cattle to sleep on but not to eat. Let the Indian visitor look about him in Europe. He will find every farm-house encircled by as many hay-stacks as straw-stacks.

What the Italian Farmer Does.

The Italian peasant lives in a joint-family with his brothers like the Indian and is much attached to his brother, and will greatly lament if his brother dies, but far more if his ox dies. Such is the high estimation of cattle in a country where the bullock is the mainstay of the house though the cow is no object of religious veneration. Let the Indian visitor to Italy learn to appreciate the feeling of the Italian ryot towards "the pious ox whom the mild Virgil loved" and he will come back to India and found a Cattle Protection Society, no longer to protect the Hindu sacred

cow from the Muhammadan butcher, but to protect all cattle against the heartless neglect and unconscious cruelty of the East.

The paddy-farmer of India, who knows no better than to sow paddy every year in all his fields, has some excuse in the supposed greater value of the crop. But the dry farmer has not even this. His dry crops are usually of little value and it is his clear duty to sacrifice some of them every year and to grow fodder crops for his beasts. It will also pay him. In my part of Italy we used, in my father's time, to divide the land into four parts, one for wheat, one for maize, two for fodder, and rotate these three crops. The peasant paid his taxes out of the wheat, fed himself and his family on the maize, and his cattle on half the produce of his farm. So he maintained himself and his family on one-quarter of the farm and gave half to his cattle. Now we go even further. We divide the farm into five parts, one for wheat, one for maize, three for grass and fodder; and we find it pays. Cattle pay us quite apart from milk products which we do not get in the dry farms. We reckon one-third of our total profits comes from buying cattle as calves and selling them as adults. The reduction of our wheat and maize areas has done us no harm. With more and better cattle and more cattle manure we plough and manure better and we get a bigger food-crop yield from 2/5ths of the land than we used to from half. Again and again I say without good cattle agriculture will not flourish in India. The present miserable Indian breeds must be entirely replaced. The new breeds must be fed sufficiently, housed properly and restricted in their breeding. Aged cattle should not be kept at all, and young cattle should not be allowed to breed.—*The Statesman*, 19th and 20th September, 1925.

X

Maximum Conclusion from Minimum Data.

A Plea for the Restriction of Premature Publication.

Arthur H. Rosenfeld, *Special Technologist for Cane, Porto Rico Insular Experiment Station.*

More than a decade ago, in reporting on results from some varietal tests of sugarcane in Argentina the author had the following to say :—

(1) *In regard to Accurate and Scientific Experimentation.*—"To experiment with any feature of cane culture, and particularly with varieties, is an extremely difficult undertaking, and one from which it is very hard to draw conclusions, unless all conditions are made extremely comparable. One of the most important factors is to have all varieties on a piece of soil which is of as regular composition throughout as possible. This means, then, that we must not have our individual experiments too large, else they will cover such a large area that part of the soil is likely to be of

a materially different composition from another part, thus rendering our experiment inconclusive, and, also, it is impossible to make a sufficiently large number of experiments if we devote a very large area to each. To obtain accurate results in any experiment there must be but one variable factor and that factor the one under investigation. If, for example, we are experimenting with fertilizers, we must see that all plats are planted with the same variety of cane, with rows as nearly as possible equidistant from each other and that all conditions of cultivation, irrigation and harvesting are as far as possible identical. The only treatment which one lot should receive which the others do not is the different kind or different quantity of manure applied. With our variety experiments the same laws apply. Every condition, from the preparation of the soil to the harvesting of the cane, must be as nearly identical as possible in the case of each variety, or as nearly so as human ingenuity and foresight can make them, so that we may with a fair degree of safety ascribe any difference in yield or composition of the cane to the individual characteristics of the varieties under trial.

"While we must not have our plots too large, neither can we afford to have them too small, for then we run the risk of letting some small disturbing factor have too great an effect on our final calculations. We do not think that it is equitable to calculate out the yield of a hectare from one or two meters under experiment, for, in this case, a few canes destroyed by a ground rat or a pilfering peon may mean a difference of hundreds of kilograms when these results are calculated to an extension many times greater. A small difference in the soil composition in one particular spot may have the same effect or even the droppings of the draught animals. We have figured, therefore, that a row of fifty meters will meet most conditions and at the same time furnish us with a good basis of comparison of varieties. When the amount of seed cane from any particular variety is not sufficient to plant close to this extension, planting in the actual field experiments is delayed until we have increased our quantity.....of this variety to an amount sufficient to plant the desired area."

(2) *Danger of Basing Opinions on Chemical Analyses alone.*—"In this connection it may be timely to call attention to a very common and, indeed, dangerous cause of error. This is the custom of publishing and attempting to draw conclusions from chemical analyses alone, where there is not sufficient cane to judge as to what tonnage can be secured. To the sugar planter or manufacturer the fact that a cane gives 18 or 19 Brix and 16 to 17 sugar is of absolutely no importance if that variety.... does not yield a sufficient tonnage to make the actual return of sugar per

Year	Total Yield in Maunds	Yield per acre in Maunds
1923—24	1,310	13.5
1924—25	490	5.0
1925—26	360	3.7
1926—27	950	9.8

From these figures, it is seen that the best yield per acre fell from 29.5 maunds in 1909—10 to 13.5 maunds in 1923—24 and further to 9.8 maunds in 1926—27.

Another estate for which statistics are available is 95 acres in extent and is situated in the Belur-Mudigere area, and the yields are as follows :—

Year	Total Yield in Maunds	Yield per acre in Maunds
1917—18	880	9.0
1918—19	720	7.5
1919—20	1,920	20.0
1920—21	640	7.0
1921—22	1,600	17.0
1922—23	1,280	13.5
1923—24	960	10.0
1924—25	960	10.0
1925—26	520	5.5
1926—27	1,600	17.0
Average per year for the whole period		11.6

This estate has not suffered so much neglect as the previous one and is also in a much better condition.

Even with regard to manures, about 15 to 20 tons of some manure or other has been used almost every year.

For the sake of comparison, the yields from an estate of 165 acres in Coorg are given below :—

using as our basis of comparison, if, for a series of years, any of these canes should prove superior to our native canes, we have indeed secured good varieties—and varieties which should mean thousands of dollars to the growers and manufacturers."

While, as stated above, the preceding remarks were made more than a decade ago, the author feels that they are just as applicable to present tendencies in the publication of so-called "results" from observations on cane varieties as they were when made. It is a sad commentary on our progress in the study of sugarcane varieties during the past generation that so many figures on yields and analyses have crept into the literature which cannot by any stretch of the imagination be dignified by the term of data. The result is a loss of confidence on the part of the awakened planter in the work of public and private experiment stations accompanied by a renewal of his inherent prejudice against the "Book Farmer", as well as increased confusion for the worker with varieties of sugarcane who is trying to correlate the reliable data of other workers with result he has himself obtained. No one interested in the general betterment of conditions in the cane industry, and particularly in the substitution in many countries of the varieties now in use by canes of proven superiority, can fail to deplore the large amount of premature publication of "results" which represent neither sufficient time nor the proper area of experimentation to warrant these figures being allowed to clog up the literature. As poorly cooked food may often be worse in its effects on the body than no food at all, so unseasoned and unreliable data or hasty, scientifically unwarranted conclusions in experimental work may, through repeated appearance in the literature of cane varieties, leave a trail of mental indigestion, pronounced scepticism and lack of confidence in scientific work in their wake.

Much precious time could be saved, much duplication of varietal experiments obviated and many funds diverted to additional useful projects in our experiment stations were our varietal workers to limit their publication of data to figures which are in every sense comparative and representative and confine them to varieties which, after several years of experimentation, are truly worthy of figuring as definitely promising varieties. And, where this is done, planters the world over would turn for advice to our experiment stations far more readily, our progress in the application of our varietal results would be greatly enhanced and, hence, our usefulness to those for whose ultimate benefit we are striving—the planters—would be materially increased.

Why rush into print with half-boiled results and haphazard conclusions from absolutely non-comparative experiments when there is so

much valuable, really worthwhile and scientifically accurate data obtainable ? Why confuse varietal workers and interested planters within definite figures when there is an abundance of useful and trustworthy information which could be imparted to them ? If some new variety looks particularly promising in some particular spot, the chances of its being tried out on a large scale and becoming a factor in increased production anywhere are surely far greater if no mention is made of it in the literature until we can back up our observations with reliable cultural and chemical data than if we rush into print with a few favourable observations on this find. We who call ourselves scientists should be far above pushing or "advertising" this or that variety for any reason whatsoever other than it has over a series of years and under the most rigid comparative conditions proved superior in every way to the standard varieties of that particular section or country.

There have been numbers of this sort of publication which have seen the light in recent years, but the writer, for the purposes of this article and for the sake of brevity, shall merely call attention to a few typical instances without mentioning either the name of the publication in which they have appeared or the authors of the articles in question. He desires in no manner to criticize either the publications or the authors of the articles whose good work in many cases he recognizes and admires, nor to arrogate unto himself the rule of either critic or censor—his only wish is to illustrate the points brought out in this little paper and to interest his colleagues in a question which appears to him vital for the most efficient results from our common efforts and investigations.

Early this year a paper was published on a variety of sugarcane reported by the authors as being a most remarkable yielder both agriculturally and industrially. In fact, under the title of "Enormous Yields" on one page we find the information that this variety with proper cultivation can give a yield of 250 tons per hectare, equivalent to over a hundred tons per hectare, indeed, the authors make the categorical statement that, "By deep hole planting, this improved cane gave 250 tons of cane per hectare". This is, indeed, an "Enormous Yield", and were we to accept this statement on its face we would decide that the Hawaiian planters, with their remarkable records of yields from H109 on some plantations, notably Ewa, had been quite eclipsed by this new "improved" variety. But, before waxing too enthusiastic over this remarkable feat, let us examine the data on which these conclusions are based. We find that they are founded entirely on results obtained from one stool ! Let us quote the authors exactly :—

"Eighteen canes were cut from this stool, 19 strong suckers being left. But before crop two large canes were cut ; one (Sic !) for analysis and the other for propagation. The weight, counting in these two canes, was 103.5 klgs. for this stool or plant. As can be seen, with careful cultivation this cane can give 100 klgs. of harvest cane per stool and *admitting a well spaced plantation of* 2 *meters* × 2 *meters, there will be room for* 2,500 *stools per hectare*, which will yield 250,000 klgs. of cane."

Can these results from one such isolated stool, without any comparative data whatsoever on the yield of some other standard variety under identical conditions, be accepted as being representative of what this particular variety will do under actual field conditions and the analysis of one selected stalk of cane be considered as a trustworthy indication of the manufacturing value of the product of an entire field ? Almost anyone who has taken the trouble to make such analyses knows that by analyzing individually, say 12 well developed canes from a good stool of any variety, he can find variations in the sugar content, and purity of the juices of the various canes of as much as 50 per cent amongst themselves. And few real fieldmen would care to calculate on a 100 per cent stand in any cane field and on an absolutely maximum development of each individual stool. The author has no hesitancy in stating that, on the same basis as that employed by the authors of the article in question, he can find in almost any field of any variety individual stools which will weigh enough to calculate out a yield per acre of 100 tons were he to presume that all stools in that acre or field would weigh absolutely the same—which, of course, could never happen. He has just as little hesitancy in affirming that in the self-same field of the same variety he could find a number of poorly developed stools which, if figured out from the yield of one of these, would show a theoretical yield of less than ten tons per acre. And from the standpoint of practical estimation of a field one such guess would be just about as good as the other !

The writer cannot help feeling that we commit a grievous error—perhaps sin would be more exact !—when we make recommendations on any such limited observations as the above—when we put into print conclusions based on extremely scanty data. Our readers are likely to have enthusiastic expectations where there is no sufficient information at hand to justify such an attitude, and our colleagues are befuddled with data which are not yet such. A further illustration of this fact can be found in a statement made some months ago by a rather well-known worker with sugarcane to the effect that the Barbados Hybrid 10 (12) variety was not promising in his country because it does not stand drought. Now the writer happens to know that these observations are based solely

on the cane from six small cuttings planted considerably less than a year before this statement was printed under conditions not very closely approximating those of the average cane field. Certainly there had been insufficient time in which to judge of the drought resistance of this promising variety, particularly as the judgment is given—and published—after very limited observation under one single set of conditions and on one particular soil type. Such a note might very appropriately be made in the field-book of an experiment station, but to publish it in a sugar journal for the information of interested planters seems a rather premature step. Of course, the fact that this particular variety stands drought rather remarkably well in Barbados, Porto Rico and Santo Domingo does not necessarily mean that it is going to do as well in other countries, but, at the same time, B.H. 10 (12) is a very promising variety and it seems decidedly inadvisable to discourage its further trial in any country to which it might be adaptable through the publication of isolated unfavourable observations.

This pair of instances will serve to illustrate the author's point and further examples would seem unnecessary, although plenty of them exist. Those mentioned will serve as typical of a tendency for the correction of which the writer feels that his colleagues can well lend their ardent co-operation. Frequently we allow little ills to develop into serious maladies, forgetful of the old adage that an ounce of prevention is worth a pound of cure. If we will all resolve not to publish data until they are thoroughly worthy of the name of such the necessity of articles of this nature will rapidly disappear—pherhaps a desideratum in itself!

Scientia veritas est.

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